

## REMARKS

### I. Status of the Application

Claims 25-43 are pending in the application. New claims 44-47 have been added. Claims 25-37, 40 and 43 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Johnston, U.S. Patent No. 2,401,077, in view of Arndt, U.S. Patent No. 3,843,828, further in view of Rubens, EP No. 0 438 783. Claim 38 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Johnston, in view of Arndt and Rubens, further in view of Bond et al., U.S. Patent No. 5,210,958. Claim 39 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Johnston, in view of Arndt and Rubens, further in view of Scott et al., U.S. Patent No. 3,925,560. Claim 41 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Johnston, in view of Arndt and Rubens, further in view of Bond et al. Claim 42 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Johnston, in view of Arndt and Rubens and Bond, further in view of Hovmand et al. et al., U.S. Patent No. 4,062,641.

Applicant has amended the claims to more clearly define and distinctly characterize Applicant's novel invention. The amendments to the claims can be found in the specification and the claims as originally filed. Claim 25 was amended to correct an inadvertent typographical error. Specifically, claim 25 was amended to recite the weight ratio between the product in liquid form and steam is between about 1.6 and "10" instead of "1.0". Support for a ratio of 10 can be found in the specification at least at page 8, lines 28-29, where Applicant teaches a ratio of between 1.6-10 kg product per kg steam. Support for new claims 44-46 can be found in the specification at least at page 6, lines 16-18, where Applicant teaches food products, and that food products can include infant foods or sports foods. Support for new claim 47 can be found at least at claim 10 as originally filed, which taught a solid content in the product of 0.7-6.5 kg per kg

steam. Applicant respectfully submits that the amendments presented herein do not raise new issues requiring further search, and add no new matter.

Applicant notes that the Examiner has indicated that a certified copy of the priority document has not yet been received. In response, Applicant respectfully submits that a certified copy of the priority document, Dutch Patent Application No. NL 1016981, is being submitted herewith.

**II. Claims 25-37, 40 and 43 are Nonobvious over Johnston in view of Arndt further in view of Rubens**

At page 2, section 3 of the instant Office Action, claims 25-37, 40 and 43 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Johnston, U.S. Patent No. 2,401,077, in view of Arndt, U.S. Patent No. 3,843,828, further in view of Rubens, EP No. 0 438 783. The Examiner is of the opinion that it would have been obvious to modify the method of the Johnston reference by maintaining the weight flow rates of liquid product to steam at certain values since the mixing chamber temperature depends on such weight flow ratios as taught by the Rubens reference and optimizing such flow is a matter of routine experimentation that depends on the liquid product sterilized. The Examiner is further of the opinion that it would have been obvious to modify the process of the Johnston reference by minimizing the size of the mixing chamber and thus the residence time as taught by the Rubens reference since milk can be sterilized in less than one second in order to prevent undesirable chemical or physical changes due to steam sterilization as taught by the Johnston reference since such a residence time modification is a matter of routine experimentation.

Applicant respectfully traverses this rejection. Applicant respectfully submits that to render a claimed invention obvious, each and every claim limitation must be taught or suggested

by the prior art. The cited references, alone or in combination, fail to teach or suggest each and every element of the claimed invention. The pending claims are directed to method for *pasteurizing or sterilizing a product* in liquid form *which includes a heat sensitive substance* comprising substantially atomizing the product in liquid form while admixing steam in a mixing chamber heated by the steam, *such that microorganisms are killed*, wherein the product in liquid form has a *solid content of at least 45 wt.%,* the steam is introduced into the mixing chamber at a steam pressure of between about 3 bar and 20 bar, the *residence time of the product in the mixing chamber is between about 0.2 msec and 20 msec,* and the *weight ratio between the product in liquid form and steam is between about 1.6 and 10.*

The Johnston reference fails to teach or suggest the claimed invention. The Johnston reference is directed to a method for sterilizing liquids such as milk and milk products (page 2, left column, lines 3-7). Johnston fails to teach or suggest the claimed solid content of at least 45 wt. %, the claimed residence time of product in the mixing chamber of between about 0.2 msec and 20 msec, or the claimed weight ratio between the product in liquid form and steam is between about 1.6 and 10, which the Examiner admits at page 2 of the instant Office Action. The Examiner is of the opinion that the Johnston reference recognizes that prolonged residence time leads to chemical changes in food products and that, for example, milk can be sterilized in less than one second using steam: “liquiform feed products, including *milk*, etc....*inside of one or two seconds time*” (Johnston, page 3, right column, lines 21-23, emphasis added). However, nowhere does Johnston teach or suggest that sterilization may be achieved in the claimed time period of between *0.0002 seconds* and *0.02 seconds*, a time period that is many times shorter than the one or two second time period taught by Johnston.

Applicant's discovery that a product in liquid form could be sterilized in a time period of between *0.0002 seconds* and *0.02 seconds* is a surprising advance over the state of the sterilization/pasteurization art at the time of filing. At that time, much longer time periods were thought to be necessary to achieve sterilization or pasteurization. Indeed, the Johnston reference teaches that sterilization occurs inside of *six seconds*, inside of two seconds or inside of one second (page 2, left column, lines 64-67 and page 3, right column, lines 21-23). With respect to pasteurization, Applicant respectfully submits that milk is typically pasteurized for *at least two seconds* (Attachment A, *Wikipedia* definition of pasteurization, first paragraph under milk pasteurization heading). Thus, at the time of filing, sterilization or pasteurization simply was not performed in less than a second, let alone in hundredths or ten-thousandths of seconds, as claimed by Applicant. For at least these reasons, Johnston fails to teach or suggest the claimed invention.

The Arndt reference fails to cure the deficiencies of the Johnston reference. The Arndt reference fails to teach or suggest the claimed residence time between 0.2 msec and 20 msec or a liquid to steam weight ratio between 1.6 and 10, which the Examiner admits at page 3 of the instant Office Action. Accordingly, the combination of the Johnston and Arndt references fails to teach each and every element of the claimed invention.

Furthermore, Applicant respectfully submits that the Arndt reference is non-analogous art and, therefore, is not properly combinable with the Johnston reference. The Federal Circuit has adopted a two-step test for determining whether particular references are within the appropriate scope of the art (*In re Deminski*, 796 F.2d 436, 230 USPQ 313 (Fed Cir. 1986)). First, it must be determined whether the reference is "within the field of the inventor's endeavor," Second,

assuming the reference is outside that field, it must be determined whether the reference is “reasonably pertinent to the particular problem in which the inventor was involved.”

The Arndt reference is not within the field of Applicant’s endeavor, i.e., the art of pasteurization and sterilization. Instead, Arndt is concerned with heat and pressure treatment to alter the flavor and aroma of a simulated milk product. Arndt teaches that elevated heat treatment can be used to weaken or break tenacious bonds between noxious substances and protein molecules in order to flash off the noxious substances to improve the flavor and odor (column 2, lines 8-17, column 4, lines 43-48). Nowhere does the Arndt reference provides any teaching regarding sterilization or pasteurization.

Furthermore, the Arndt reference is not reasonably pertinent to the field of sterilization and pasteurization. Sterilization or pasteurization are not simply the mere heating of a substance such that microorganisms in the substance are killed. One of skill in the art performing such methods needs to be concerned with a variety of factors that are not addressed by heating arts outside of the field of sterilization and pasteurization. For example, one of skill in the filed of sterilization or pasteurization must take care not to expose the substance being sterilized or pasteurized to an excessive or lengthy application of heat, which can affect the flavor and stability of the substance (see, e.g., Johnston, page 1, left column, lines 35-42). One should also take care to prevent or minimize damage of heat-sensitive components and to avoid organoleptic changes (specification, page 1, lines 15-17). Arndt is not concerned with such issues because this reference does not address pasteurization or sterilization, let alone potential problems or difficulties encountered with sterilization or pasteurization. Thus, one of skill in the art of pasteurization or sterilization would not look to a reference that teaches heating of a substance for purposes other than sterilization or pasteurization.

The Rubens reference fails to cure the deficiencies of the Johnston and Arndt references. Rubens is directed to a method and apparatus for cooking and spray-drying starch (abstract). Rubens et al. fails to teach or suggest a residence time between 0.2 msec and 20 msec or a liquid to steam weight ratio between 1.6 and 10 as claimed by Applicant.

The Examiner is of the opinion that it would have been obvious to modify the process of the Johnston reference by minimizing the size of the mixing chamber and thus the residence time as taught by the Rubens reference since milk can be sterilized in less than one second in order to prevent undesirable chemical or physical changes due to steam sterilization as taught by the Johnston reference since such a residence time modification is a matter of routine experimentation. Applicant disagrees. Based on the Johnston reference and the knowledge in the sterilization/pasteurization art at the time of filing, one of skill would not look to the very short time periods claimed as mere optimization, but rather as a surprising advance in the art.

The Examiner further states that the Rubens reference teaches that the starch mass flow is 7.26 kg/min and the steam mass flow is 901 kg/min for a ratio of 0.58. A ratio of 0.58 is not within Applicant's claimed range. The Examiner is of the opinion, however, that the teachings of Rubens implicitly mean that the flow rates for starch and steam can vary depending on the operational model used, and that it would be obvious to modify Johnston as a matter of routine experimentation that depends on the liquid product sterilized. Applicant disagrees. Based on the teachings of the Rubens reference, one of skill in the art would not be motivated to increase the ratio to a value within Applicant's claimed range due to the potential for nozzle blockage when spraying gelatinized starch having a high starch slurry ratio. As such blockage would be detrimental to the techniques of spray-drying starch taught by Rubens, one of skill in the art

would find no motivation to alter the teachings of Rubens to increase the starch slurry ratio. Accordingly, the Rubens reference fails to cure the deficiencies of the primary references.

Furthermore, Applicant respectfully submits that the Rubens reference is non-analogous art that is not properly combinable with the Johnston reference. Rubens is directed to cooking and spray-drying starch and neither teaches nor suggests pasteurization and/or sterilization. The art of cooking and spray-drying starch is not within the field of applicant's endeavor, i.e., pasteurization and sterilization. Applicant further submits that the Rubens reference is not reasonably pertinent to the field of sterilization and pasteurization. One of skill in the art would not look to the field of cooking starch or drying cooked starch to alter known methods of pasteurization and/or sterilization for at least the reasons set forth above for the Arndt reference.

Thus, the combination of references fails to teach each and every element of the claimed invention. Accordingly, Applicant respectfully requests that rejection of claims 25-37, 40 and 43 under 35 U.S.C. §103(a) as being unpatentable over Johnston, in view of Arndt, further in view of Rubens, be reconsidered and withdrawn.

**III. Claims 38 and 41 are Nonobvious over Johnston in view of Arndt and Rubens further in view of Bond et al.**

At page 8, section 3 of the instant Office Action, claim 38 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Johnston, in view of Arndt and Rubens, further in view of Bond et al., U.S. Patent No. 5,210,958. The Examiner is of the opinion that it would have been obvious to modify the process of the Johnston reference by including a steam re-circulating means as taught by Bond et al. in order to lower the overall energy consumption of the process. At page 9, section 5 of the instant Office Action, claim 41 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Johnston, in view of Arndt and Rubens, further in

view of Bond et al. The Examiner is of the opinion that it would have been obvious to modify the process of the Johnston reference by including a steam drying means as taught by Bond et al. since steam drying can lead to a considerable capital cost savings and can also lead to faster dry processing of products. Applicant respectfully traverses these rejections.

The Bond reference fails to cure the deficiencies of the primary references. Bond et al. is directed to a method and apparatus for drying paper by passing a wet paper web over a series of cylinders containing saturated steam (column 1, lines 7-14). Bond is not concerned with pasteurization or sterilization and as such is non-analogous art not properly combinable with the Johnston reference. Furthermore, nowhere does Bond et al. teach or suggest a residence time between 0.2 msec and 20 msec or a liquid to steam weight ratio between 1.6 and 10 as claimed by Applicant.

Thus, the combination of references fails to teach each and every element of the claimed invention. Accordingly, Applicant respectfully requests that rejection of claims 38 and 41 under 35 U.S.C. §103(a) as being unpatentable over Johnston, in view of Arndt and Rubens, further in view of Bond et al., be reconsidered and withdrawn.

**IV. Claim 39 is Nonobvious over Johnston in view of Arndt and Rubens further in view of Scott et al.**

At page 8, section 4 of the instant Office Action, claim 39 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Johnston, in view of Arndt and Rubens, further in view of Scott et al., U.S. Patent No. 3,925,560. The Examiner is of the opinion that it would have been obvious to modify the process of the Johnston reference by including a spray-drying step after steam sterilization that produces particles with diameters between 10 to 60 micrometer



as taught by Scott et al. in order to form voids in the particles resulting in added advantage. Applicant respectfully traverses this rejection.

Scott et al. fails to cure the deficiencies of the primary references. Scott et al. is directed to high-energy, lipid-containing, feed supplements for ruminants comprising homogeneous lipid bodies dispersed within a medium (title, abstract). Scott et al. is not concerned with pasteurization or sterilization and as such is non-analogous art not properly combinable with the Johnston reference. Furthermore, nowhere does Scott et al. teach or suggest a residence time between 0.2 msec and 20 msec or a liquid to steam weight ratio between 1.6 and 10 as claimed by Applicant.

Thus, the combination of references fails to teach each and every element of the claimed invention. Accordingly, Applicant respectfully requests that rejection of claim 39 under 35 U.S.C. §103(a) as being unpatentable over Johnston, in view of Arndt and Rubens, further in view of Scott et al., be reconsidered and withdrawn.

**V. Claim 42 is Nonobvious over Johnston in view of Arndt and Rubens further in view of Hovmand et al.**

At page 9, section 6 of the instant Office Action, claim 42 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Johnston, in view of Arndt and Rubens, further in view of Hovmand et al., U.S. Patent No. 4,062,641. The Examiner is of the opinion that it would have been obvious to modify the process of the Johnston reference by including a re-circulating means for non-agglomerated particles as taught by Hovmand et al. since a certain degree of agglomeration is desired for good dispersibility of food products in water and milk. Applicant respectfully traverses this rejection.

Hovmand et al. fails to cure the deficiencies of the primary references. Hovmand et al. is directed to an agglomeration unit that permits thorough wetting of powder and good hygienic conditions (column 1, line 4 and column 2, lines 52-56). Hovmand et al. is not concerned with pasteurization or sterilization and as such is non-analogous art not properly combinable with the Johnston reference. Furthermore, nowhere does Hovmand et al. teach or suggest a residence time between 0.2 msec and 20 msec or a liquid to steam weight ratio between 1.6 and 10 as claimed by Applicant.

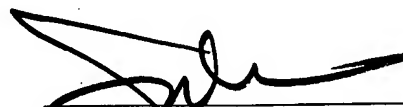
Thus, the combination of references fails to teach each and every element of the claimed invention. Accordingly, Applicant respectfully requests that rejection of claim 42 under 35 U.S.C. §103(a) as being unpatentable over Johnston, in view of Arndt and Rubens, further in view of Hovmand et al., be reconsidered and withdrawn.

#### **VI. Conclusion**

Having addressed all outstanding issues, Applicant respectfully requests reconsideration and allowance of the case. To the extent the Examiner believes that it would facilitate allowance of the case, the Examiner is requested to telephone the undersigned at the number below.

Respectfully submitted,

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